Air

Air is a carrier of oxygen. We assume in simple cases that N2 in air remains inert, as do the 'rare' gases.

% by Volume	Gas
0.000006	Xenon
0.00005	Krypton
0.0004	Helium
0.00123	Neon
0.01	Hydrogen
0.03	Carbon doxide
0.94	Argon
78.03	Nitrogen
20.99	Oxygen

As the rare gases are all inert and behave similarly to nitrogen it is engineering practice to lump them altogether, and Put

79 % by volume - N_2

21 % by volume - O_2

Therfore, Ratio N2/O2 by volume is 3.76

Molar mass = 28.96 kg/ kmol

Rair = 287.1 J/kg K

That is, 3.76 kmol of Nitrogen accompany each kmol of oxygen when fuels are burned in air

Theoretical air for the complete combustion of all the elements present in the fuel is called stoichiometric air. If the air is more than the stoichiometric, it is called excess air.

It is expressed as %. If the excess air is 200% then three times as much air is supplied as required stochiometrically.

The defects associated with the supply of excess air are:

1. It lowers the combustion gas temperature
2. It lowers the heating rate.

Air for combustion is divided as primary air and secondary air. Primary air provides a percentage of combustion air, but more importantly, controls the amount of fuel that can be burned. Secondary air helps in burning fuel completely. The volatile that escapes from the fuel is completely burned by secondary air. Most of the stoves in the developing countries lack secondary air resulting on emission.

Air fuel ratio

It is used for quantify the amounts of fuel and air in a particular combustion process. The air fuel ratio is the amount of air in a reaction to the amount of fuel. The ratio can be written on a molar basis or on a mass basis.

It is in the products of combustion that the excess air ratio becomes important. And the temperature of the reaction must then be substantially cooler. Note that it is only by analysing the flue gases that one (normally) can determine the actual Air Fuel ratio.

Excess Air

Calculate yourself